Water Conservation Program in Rural Sonoma Valley

Grant Program Report

April 18, 2011

SONOMA COUNTY WATER AGENCY

Water Conservation Program in Rural Sonoma Valley

The Water Conservation Program in Rural Sonoma Valley (Program) received a grant from the North Bay Watershed Association (NBWA) to conduct a pilot program to evaluate water conservation programs for areas within NBWA service area that currently do not have formal conservation programs. These water users are not connected to municipal water supplies or to community sanitation systems. The proposal was submitted by the Sonoma County Water Agency, City of Sonoma (Sonoma), Valley of the Moon Water District (VOMWD) and Sonoma Valley County Sanitation District on behalf of the Sonoma Valley Basin Advisory Panel.

The Sonoma Valley Basin Advisory Panel has determined that water conservation programs in areas outside of urban areas (i.e., Sonoma and VOMWD) are a high priority to improve water resources in the Sonoma Valley (Schlumberger, 2007).

Program Funding

Funding for implementing the Program came from multiple sources. The NBWA grant provided $25,000 that was mainly utilized to conduct the site assessments in addition to a small portion of the program coordination. Sonoma and VOMWD provided low flow hardware, dye tablets, general water conservation outreach materials and other in-kind services for the program. The Sonoma County Water Agency and the Sonoma Valley County Sanitation District funded the data analysis, report preparation, outreach and administration of the program. The program had a total budget of $40,000.

Rural Residential Site Assessments

There were a total of 15 residential site assessments completed through the regional Water Smart Home Program (WSHP) for the Program. The WSHP solicited participants, scheduled assessments and performed the assessments which take an hour to an hour and a half to complete. Trained staff visited the participants at their home to assess their water use by testing their toilets, faucets and showers for leaks and to document flow rates. They determined the efficiency level of clothes washers and water softeners. Outdoors, staff tested irrigation systems, looked for leaks, and performed catch-can test to determine irrigation system efficiency. Then, if

necessary and at the discretion of the home owner, staff reprogrammed irrigation timers to improve the efficiency of automatic irrigation systems. A report detailing the results of the assessment, recommendations, and outreach materials were provided to each homeowner at the end of the visit.

The number of assessments completed was limited by the lack of participants who were not served by both municipal water and sewer services. The sample size is too small to be a statistically significant representation of the population of homes, but does provide a general idea of the opportunities available to improve water-use efficiency. The assessments focused on six water using devices: toilets, showerheads, faucets, clothes washers, water softeners, and landscape irrigation controllers.

Water Smart Home staff reviewing survey results with a customer.

Toilets

Toilet water use is the largest residential indoor water use representing nearly 27% of indoor use. A total of 48 toilets were measured in the 15 participating homes averaging 3.2 toilets per home. The average flush volume was 2.1 gallons per flush (gpf) while the median flush volume was 1.6 gpf. The current standard for toilets is a flush volume of 1.6 gpf. This shows that of these homes, the majority (71%) of the toilets are efficient. This high level of efficiency is not typical of a population of homes that has not been served by water conservation programs and may be a result of the small sample size or that those who have volunteered to participate were more inclined to be efficient.

Number of Toilets Measured	48
Average Toilets per Home	3.2
Average Flush Volume (gpf)	2.1
Median Flush Volume (gpf)	1.6
Number of Inefficient Toilets (greater than 1.9 gpf)	14 (29%)
Number of Leaking Toilets	1 (2.8%)

Showerheads

Water use from showers represents an average of 16.8% of indoor water use. The current standard flow rate for showerheads is 2.5 gallons per minute (gpm). Of the 43 showerheads measured, the average flow rate was 2.1 gpm with a median of 2.0 gpm. Only three showerheads were measured to exceed the current flow rate standard.

Participants were provided with free 1.5 gpm showerheads when flow rates could be reduced.

Number of Showerheads Measured	43
Average Showerheads per Home	2.9
Average Flow Rate (gpm)	2.1
Median Flow Rate (gpm)	2.0
Number of Showerheads Exceeding Current Standard (greater than 2.5 gpm)	3 (7.0%)

Faucets

Faucet water use throughout the average household, including both kitchen and bath, represents an average of 15.7% of indoor water use. The maximum flow rate standard for faucets is 2.2 gpm. A total of 54 faucets were measured during the assessments with an average of 3.6 faucets per home. The average flow rate of the faucets was 1.8 gpm with a median flow rate of 1.5 gpm. Approximately 15% of the faucets exceeded the flow rate standard. Participants were provided with free faucet 2.0 gpm kitchen faucets aerators and 1.5 gpm bath faucets aerators where flow rates could be reduced.

Number of Faucets Measured	54
Average Faucets per Home	3.6
Average Flow Rate (gpm)	1.8
Median Flow Rate (gpm)	1.5
Number of Faucets Exceeding Current Standard (greater than 2.2 gpm)	8 (15%)

Clothes Washers

Clothes washers represent the second largest indoor water use at 21.7%. The standard top loading clothes washer can use as much as 40 gallons of water per load. A high-efficiency clothes washer will wash the same load using 40 to 60% less water. All 15 homes that were assessed had a clothes washer with 53% of them being efficient.

Number of Homes with a Clothes Washer	15 (100%)
Number of Energy Star Rated Clothes Washers	8 (53%)

Water Softeners

Water softeners are not typically found in homes in urban Sonoma County, but are more common in homes that have private wells. There were two homes in the

assessment group that had water softeners installed. This represents 15% of the homes assessed compared with 2.8% for all homes assessed through the WSHP.

Water softeners remove calcium and magnesium from the water through ion exchange. Water is passed through an exchange resin where the calcium and magnesium ions swap places with sodium ions that are charged to the resin. When the resin is full of calcium and magnesium ions, the resin is recharged with sodium ions by passing a sodium solution (sodium chloride and water) through the resin. The sodium ions then replace the calcium and magnesium ions and become suspended in the solution. This solution is then discharged as waste water.

Older water softeners were designed to regenerate based on an automatic timer which is inefficient because it regenerates at set intervals whether it needs to or not. Newer water softeners use demand initiated regeneration (DIR) where it regenerates only when needed. Neither of the two water softeners in the homes were the less efficient automatic regeneration type.

Number of Homes with Water Softeners	2 (13%)
Number of Water Softeners with Automatic Regeneration	0 (0%)

Landscape Irrigation Controllers

Landscape irrigation is typically half of all household water use on an annual basis. Depending on landscape size and composition, irrigation water use can often exceed the average. The WSHP looks for and tests automatic irrigation systems during assessments to find leaks, broken heads, and other system inefficiencies. Of the homes assessed, 11 had automatic landscape irrigation controllers, 7 of which needed to be adjusted by staff to reduce run times after performing catch-can tests to determine sprinkler system performance.

Catch-can test performed on a lawn.

Many homeowners are unfamiliar with how to manage their irrigation practices. New "smart" irrigation controllers automatically adjust run times based on the irrigation system, plants, and daily weather, among others. This daily automatic adjustment is the most efficient way to automatically irrigate the landscape. None of the homes had a smart irrigation controller. This is likely due to the high cost of the controllers

and, depending on the controller manufacturer, the monthly service fees to obtain daily weather updates.

Number of Homes with a Landscape Irrigation Controller	11 (73%)
Number of Landscape Irrigation Controllers Adjusted During Audit	7 (64%)
Number of Smart Landscape Irrigation Controllers	0 (0%)

Opportunities for Residential Properties

There are three key opportunities for residential properties to improve water efficiency. Although most toilets in this assessment were efficient, nearly one third were not. A rebate program would provide an incentive for those who have not yet replaced their older, inefficient toilets. Providing rebates for only high-efficiency toilets (1.28 gpf or less) will provide the most water savings.

Clothes washers also represent a large water saving opportunity. With nearly half of all clothes washers in the assessment being inefficient top loading models, a rebate program for clothes washers will encourage residents to replace them with new, high-efficiency models. Rebates will help to reduce the initial cost to make them more accessible. Because these residents do not pay water or sewer fees, the return on investment will be longer than for those served by utilities.

The third opportunity is with improving outdoor irrigation. With the high number of automatic irrigation controllers needing adjustment, there is a large potential for water savings through education on how to properly irrigate and how to use and program irrigation timers. There are numerous landscape education programs that should be promoted to well users that hire landscape professionals. These include the Qualified Water Efficiency Landscaper Training Program, Bay Friendly Landscaping, and Russian River Friendly Landscaping.

Agricultural Assessments

Three vineyards and six dairies were assessed thorough the Program. Additional agricultural users were solicited, but none chose to participate. For the vineyard assessments, Mark Greenspan of Advanced Viticulture, LLC was hired as the consultant. The dairies were assessed by Maddaus Water Management.

Vineyard Assessments

The three vineyard assessments focused primarily on spring and summer vineyard irrigation, although some vineyards also use water for frost protection in the winter and wine making operations in the fall. All three of the vineyards were found to be,

generally, irrigating efficiently. They were aware of the finite availability of water and their dependence on it for their livelihood. However, there were still opportunities for further water-use efficiency improvements.

Many vineyards are concerned about proprietary practices which may have limited participation in the Program. The three that did choose to participate have requested that information they considered to be proprietary be left out of the assessment reports. For this reason, nearly all quantified water usage has been excluded, but their water usage was analyzed and reported to the participants confidentially. The vineyards and the consultant have worked very closely together to improve water-use efficiency.

Vineyard Recommendations

There are several key recommendations pulled from the three vineyards that may be applicable to vineyards universally:

- Improve drip system by providing two drip emitters per vine instead of one, while maintaining the application rate, to increase the root zone. This may be done by replacing a single 1 gallon per hour (GPH) emitter with two ½ GPH emitters evenly spaced. Larger root zones help vines access more nutrients from the soil and reduce plant stress during extreme conditions.

Drip emitter on a drip irrigation system.

- Modify irrigation frequency and/or duration to fit soil profile. The soil profile can vary from vineyard block to block, and sometimes within blocks. Examining soils and rooting patterns using backhoe pits or similar methods is the first step. Installing soil moisture devices at several depths down to the bottom of the root zone will allow irrigation practices to be specifically tuned to each controllable block.

- Begin irrigation as late as possible into the growing season – after shoot tip growth slows or stops. By waiting, vines will develop deep roots to access water and nutrients from the full soil profile. Once irrigation begins, roots will be concentrated around the drip zone of the emitters. Secondary benefits include reduced costs of canopy management and overall wine quality improvements.

- Use multiple methods to monitor plant water status. Using two to three methods will help provide a complete assessment of plant water status allowing for more accurate irrigation. At least one method of plant water status should be used, with the porometer being the one most highly recommended.

Dairy Assessments

Four organic and two standard dairies were evaluated through the Program. Each dairy was analyzed individually and were reported as a group in the "Final Dairy Water Audits Report."

The dairies were very conscious about water use as they were located in areas with limited water supply and the management of wastewater and water runoff from dairy property is highly regulated. All wastewater is contained, processed, and reused to fertilize pastures. Runoff is contained to prevent animal waste from entering creeks and streams.

The majority of dairy water use is for consumption by cows at 79%. Water savings can only be achieved through the remaining 21% of use. This includes mostly washing of equipment and facilities and an estimated 7% for residential use by the families that live at the dairies.

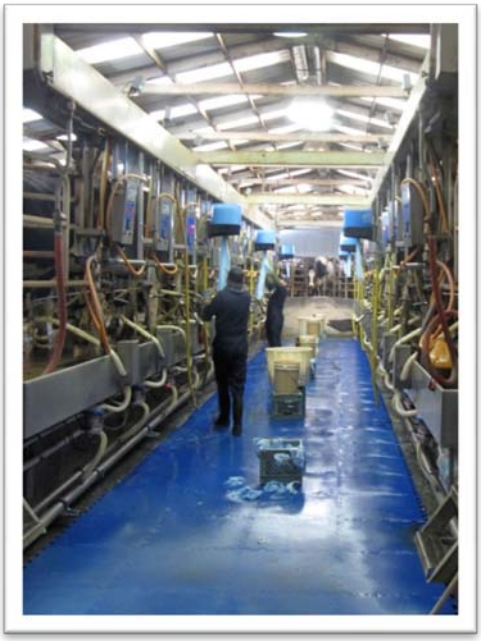
Cow Consumption	
• Lactating Cows	72%
• Dry Cows	4%
• Calves	3%
Total Cow Consumption	79%
Milk Barn Floor and Other Washing	11%
Family Residences	7%
Milk Line and Milk Tank Washing	3%

At 31 gallons per day (gpd) per cow, the average water use at these dairies are in line with the industry average of 25 to 40 gpd per cow. There were no apparent efficiencies of scale for water use related to the size of the dairies (number of cows).

Dairy Recommendations

The dairies visited were limited by the local supply of water from on-site sources such as wells, springs, and captured surface water. Dairies can maximize their water supply by utilizing the following suggestions:

- Reuse water from plate coolers for barn wash down or cow consumption. The storage of milk requires milk to be cooled after milking. The use of a plate cooler, a heat exchanger, can eliminate the need to use a refrigeration unit by transfer heat from the milk to water passing through the plate cooler. The water can then be used to clean barns and equipment or for cow consumption as the water is not contaminated in this process.
- Capture rain water from barn roofs for use around the dairy. Rain water is a source of high quality water that can be used for consumption or barn washing.
- Reuse of milk line and milk tank wash water. Approximately 3% of total water use is used for this purpose. This water can be reused for barn washing.



Dairymen milking cows in a milk barn.

Outreach and Education

Outreach and education are important tools for reaching the goals of any water conservation program. Water users must understand and be aware of the issues at hand and need to know what to do to help and how to participate. The Program has produced several targeted informational brochures and has explored the feasibility of conducting outreach towards well users.

Outreach Materials and Distribution

The Program distributed three brochures specific to rural water users. These materials were distributed throughout Sonoma Valley to educate residents. Marketing to promote awareness and solicit Program participation included attendance to the weekly farmers market, newspaper advertisements and articles, and handing out Program materials to participants in the Sonoma Valley Voluntary Groundwater Level Monitoring Program. Additionally, members of Sonoma Valley Basin Advisory Panel assisted in distributing Program brochures through interest group newsletters and briefings, including the Sonoma Valley Vintners and Growers Alliance, the Sonoma Ecology Center, the Southern Sonoma County Resource Conservation District, and homeowners associations that rely on groundwater supplies. The benefits of water

conservation specific to well owners were stressed, including reduced pumping costs and the sustainability of their local groundwater supply.

In addition, general water conservation brochures and Sunset Magazine reprints on efficient landscaping were distributed during the WSHP site visits.

Outreach and Education Seminars

Opportunities to engage and educate well users are needed to promote water conservation. The Program has found that with the existing events and seminars already in place for urban water users, it would be beneficial and cost effective to partner with existing programs and promote them to well users. Existing programs include:

- *Qualified Water Efficient Landscaper* – An education and certification program targeted towards landscapers to promote water efficient landscape practices.
- *Eco Friendly Gardening Tour* – A tour of environmentally friendly, water efficient private gardens to inspire and education the public by showing off the potential in their own back yard.
- *Bay Friendly Landscaping* – A Bay Area-wide education program promoting landscape practices that protect the Bay from run-off pollution through the pesticide and herbicide free techniques, mulching, reduced yard waste and efficient water use.
- *350 Garden Challenge* – A seminar to education and challenge residents to convert water wasting lawns to low water use, edible gardens.
- *Green Business Program* – A certification program promoting green business practices, including water efficiency.

Moving Forward

With these findings, water conservation is a feasible opportunity for rural water users. The largest challenge in providing services to them is due to the fact that there is no funding mechanism to support targeted programs whereas funding for programs for urban water users come from use rates and service fees.

Pursuing grants can be an effective way to fund programs. Collaborating with adjacent water and sewer service providers to pursue grants to fund the expansion of existing programs to rural water users can be the most cost effective way. Expanding existing programs would not incur development costs and administration costs would be minimized. With continued education and awareness, all water users can increase their water use efficiency.